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PENSOFT

Birds from northeastern Bogotá Savannah, Cundinamarca, Colombia

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Abstract
The northeast area of the Bogotá Savannah (Cundinamarca, Colombia) is a region where biodiversity requires research because of few records in the current literature. We present a list of birds from the northeast area of the Bogotá Savannah. A systematic sample was conducted in the Ecoparque Sabana Nature Reserve (Tocancipá) to record the frequency of occurrence of bird species, while opportunistic observations were made at Parque Jaime Duque Nature Reserve (Tocancipá) and Aguablanca wetland (Sesquilé). A total of 820 h of sampling was done between February 2016 and June 2019. We provide a list with 128 species belonging to 37 families. Of these species, eight are newly recorded from the Bogotá Savannah; one species is considered Endangered and three are Near Threatened according to the Red List of the International Union for Conservation of Nature. The species richness found in our study supports the importance of protected areas in the northeast area of the Bogotá Savannah. Protected areas here help conserve the biodiversity of birds of the Andean region.

Keywords
Andean forest, Neotropical region, ornithological inventory, restored habitat, South America.

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Introduction

Colombia is one of the countries with the highest diversity of plants, mammals, amphibians, and birds in the world (Rangel 2006). The Colombian avifauna is composed of 1,941 species that make up 20% of all bird species in the world (Ayerbe-Quiñones 2018). Of these species, 974 have been reported in the Andean region (Rangel 2015). The Colombian Andean region is divided into 19 subregions, one of which is the Altiplano Cundiboyacense (IGAC 1996). The Bogotá Savannah comprises the southern portion of this plateau and includes the city of Bogotá and nearby towns. The Bogotá Savannah is characterized by wetlands ecosystems (2,550–2,600 m a.s.l.), xerophytic scrublands (2,600–2,800 m a.s.l.), and paramos (3,300–4,200 m a.s.l.) (Calvachi 2012).

A total of 235 species of birds have been reported from the Bogotá Savannah, including 46 boreal migra-

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tory species, three endemic species (*Rallus semiplumbeus* P.L. Scatler, 1856, *Synallaxis subpudica* P.L. Sclater, 1874, and *Cistothorus apolinari* Chapman, 1914), four endemic subspecies (*Ixobrychus exilis bogotensis* (Chapman, 1914), *Porphyriops melanops bogotensis* (Vieillot, 1819), *Eremophila alpestris peregrina* (P.L. Sclater, 1855), and *Chrysomus icterocephalus bogotensis* Linnaeus, 1766), two species under global threat (*R. semiplumbeus* and *C. apolinari*), and four species under local threat (*Oxyura jamaicensis* (Gmelin, 1789), *Porphyriops melanops* (Chapman, 1914), *Pseudocolopteryx acutipennis* (Sclater & Salvin, 1873), and *Eremophila alpestris* (Linnaeus, 1758) (Stiles et al. 2017). Likewise, 188 species have been reported in the Bogotá wetlands (Echeverry-Galvis 2015), and 95 species have been recorded at the eastern forests from the Bogotá Protective Forest Reserve (BOBPFR) at the northeastern limit of the city (Peraza 2011). In addition, 400 species have been recorded in the Chingaza National Natural Park (PNN) (Linares-Romero et al. 2017).

Habitats in the Bogotá Savannah have been exposed to agriculture since 1500 (Etter and Van Wyngaarden 2000; Etter et al. 2008). According to Stiles et al. (2017), about 50% of the bird species in Bogotá and its surroundings have changed in their abundances over time in response to a combination of factors such as deforestation, exotic plantations, crops, climate change, and secondary succession in forests that have positively or negatively affected species. The habitats at the localities of our study are negatively affected by non-organic fertilizers, pesticides, cattle raising, deforestation, exotic plantations, crops such as corn and potatoes, and climate change (Rodríguez et al. 2006; Stiles et al. 2017). However, since 2016, the localities in our study have been positively influenced by the creation of artificial bodies of water, the planting of gardens and other afforestation patches with native vegetation, secondary succession in forests, continuous monitoring of bird populations (Stiles et al. 2017), and a reduction in hunting of some bird species, which was common in the past (Olivares 1969).

In this study, we present the results of four years (2016–2019) of systematic surveys in the Ecoparque Sabana Nature Reserve (ESNR) and opportunistic observations in the Parque Jaime Duque Nature Reserve (PJDNR), and in the Aguablanca wetland. We also present for the first time an updated list with important new records of birds in northeastern Bogotá Savannah. Besides presenting this list of the bird species, we discuss the relationship between the frequency of occurrence of species in the ESNR and the restoration process that is underway in this locality.

Methods

Study area. Ecoparque Sabana Nature Reserve (ESNR) and Parque Jaime Duque Nature Reserve (PJDNR) are two civil society nature reserves located at Parque Jaime Duque, in Tocancipá municipality (04°56′52″N, 073° 57′47″W; Fig. 1) 33 km from Bogotá in Cundinamarca department. Aguablanca is a wetland in Sesquilé municipality (05°02′43″N, 073°47′50″W; Fig. 1) 50 km from Bogotá, in Cundinamarca department. The average altitude in these localities is 2,600 m a.s.l., with wetlands, dry mountainous forests (bs-MB; Holdridge 1967), and lower Andean forests (Cortés et al. 1999). The annual median precipitation is 857 mm, with a bimodal rain regime, and there is a wet season from April to June and from September to November. The mean annual temperature is 14.1 °C, with an average of 80% relative humidity (IDEAM 2017; Climate-data.org 2018).

Parque Jaime Duque Nature Reserve (PJDNR, Fig. 2A) is part of the Tibito hill, and just like the Aguablanca wetland (Fig. 2B), shows mostly Andean forest with species such as *Xylosma spiculifera* G. Forst, 1786 (Corono), *Duranta mutisii* Linnaeus, 1753 (Espino Garbancillo), *Myrcianthes leucoxyla* (Ortega) McVaugh, 1800 (Arrayán), *Myrsine guianensis* (Aubl.) Kuntze, 1891 (Cucharo), bromelias, moss, hepatics, and lichens (Cortés et al. 1999; Pérez 2000).

Ecoparque Sabana Nature Reserve (ESNR; Fig. 2C, D) has two wetlands, which in 2016 were polluted and eutrophicated due to industrial and domestic pollution and intensive farming (Palacios and Safford 2002; Mora 2015). The main plant species that make up the vegetation in this reserve are *Cenchrus cladestinus* Hochst. ex Chiov. (Kikuyo), *Eucalyptus* spp., *Acacia* spp., *Syzygium* spp. (Eugenia), *Genista monspessulana* (L.) L.A.S. Johnson (French Broom), *Ulex europaeus* Linnaeus (Gorse), *Eichornia crassipes* (Martius) Solms (Water Hyacinth), *Hydrocotyle ranunculoides* L.F. (Floating Pennywort), and *Typha latifolia* (L.) Dulac (Broadleaf Cattail).

Data collection. We collected systematic and opportunistic observation data. In the PJDNR and Aguablanca, we carried out opportunistic observations due to the topography and dense vegetation in those areas. In the ESNR, we performed the inventory along a 4 km long transect. Along this transect, we made ten 200 m long by 50 m wide transects, which were selected because of the diversity of their vegetation structure and presence of bodies of water. Between these transects, we left 100 m long spaces where no sampling was conducted (Fig. 3). We estimated the frequency of occurrence as the number of samples where a given species was recorded divided by the total number of samplings (D'Angelo Neto et al. 1998). Two observers collected data during 41 months between February 2016 and June 2019 and did one-day expeditions each month (6 hours of sampling effort per day). Thus, we sampled for a total of 820 hours (410 hours per observer). Observations were made from 5:00 to 11:00 h (492 hours) and from 17:00 to 21:00 (328 hours).

The birds were visually identified using 10 × 42 binoculars and, when possible, photographic records were

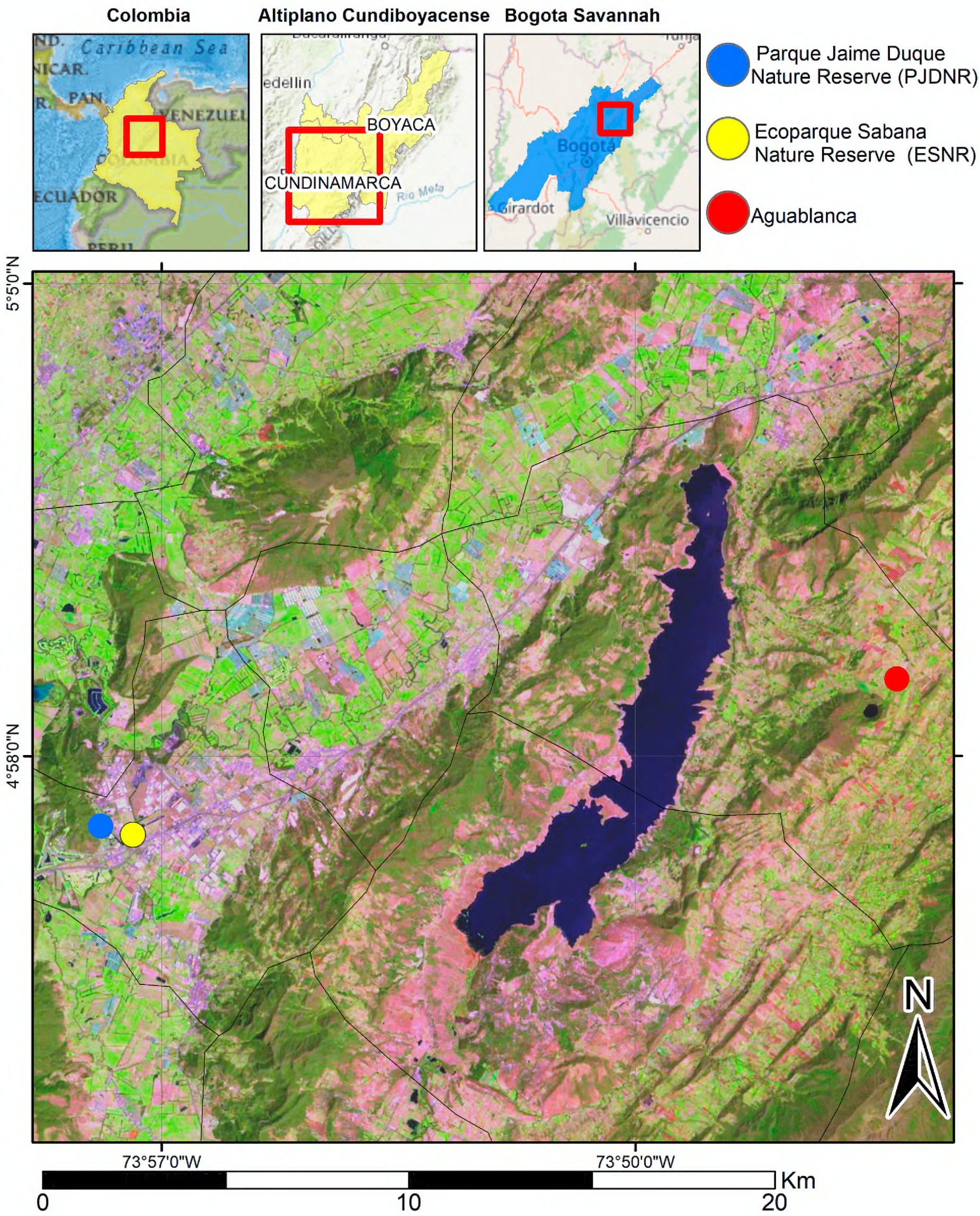

Figure 1. Map showing the locations in Tocancipá and Sesquilé municipalities, Cundinamarca department, Colombia.

taken using an 82× camera. Vocalizations were recorded with a Zoom H6 and SSH-6 Stereo Shotgun microphone recorder, and audio tracks are stored at Xeno-Canto (https://www.xeno-canto.org). Threatened species were determined according to the Red List of the International Union for Conservation of Nature's Red List (IUCN; https://www.iucnredlist.org) or BirdLife International (2018, 2019). Location of perch, reproductive events, and behavioral events such as flight, foraging, and intra- and interspecific interactions were also recorded. No specimens were collected during this study.

Taxonomy and nomenclature follow the American Classification Committee (https://www.museum.lsu.edu/~Remsen/SACCBaseline.htm). To verify the identity of the species, we used the taxonomic keys by ABO (2000), Hilty and Brown (2001), and Ayerbe-Quiñones (2018). Geographic distribution data follows the Neotropical Birds Online (2019). In order to compare our records

Figure 2. Localities sampled in the northeastern area of Bogotá Savannah. **A.** Parque Jaime Duque Nature Reserve (PJDNR; source: Orthophoto ESNR). **B.** Aguablanca Wetlands. **C–D.** Ecoparque Sabana Nature Reserve (ESNR; source: Orthophoto ESNR).

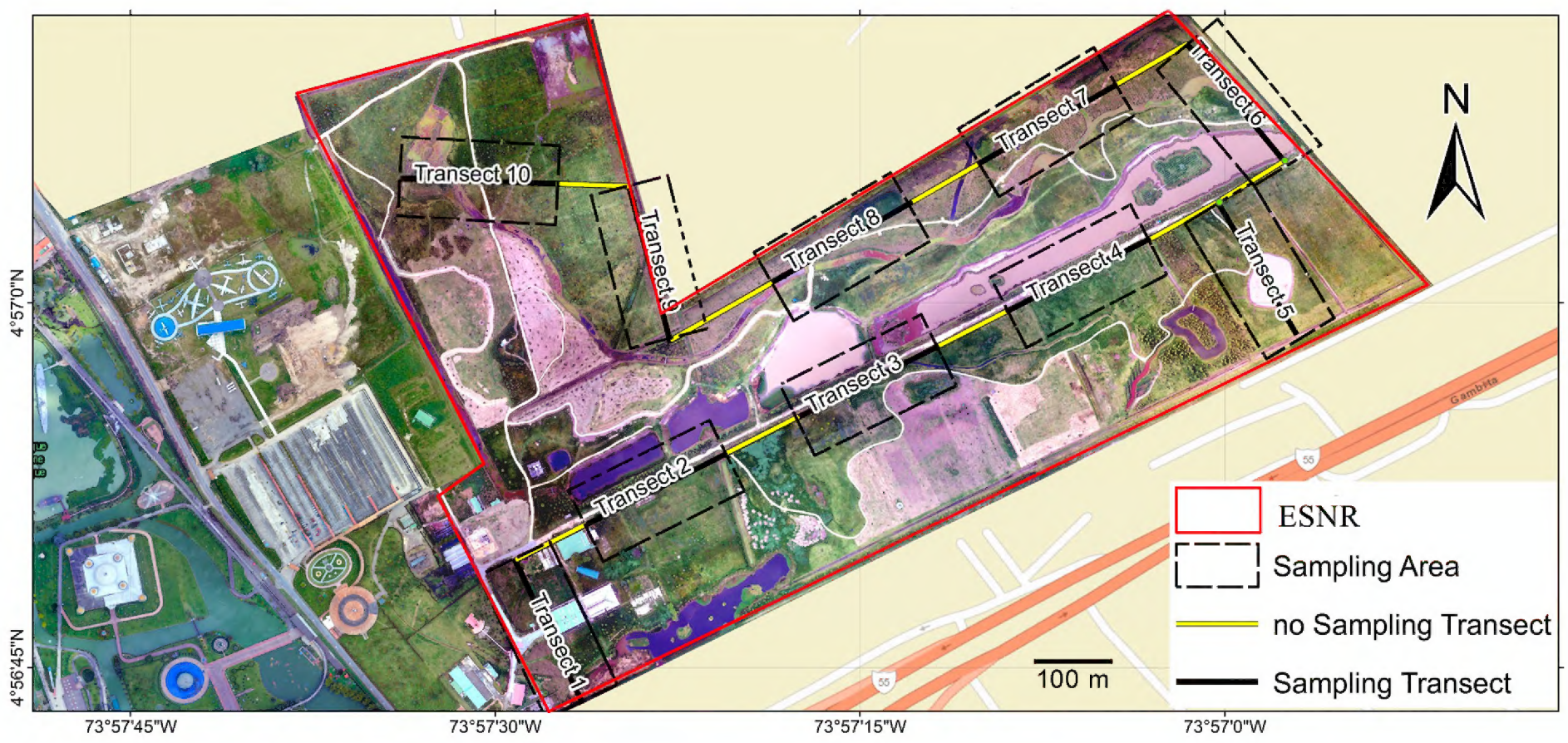

Figure 3. Sampling methods in Ecoparque Sabana Nature Reserve (ESNR), Tocancipá municipality.

with list of species from similar localities representative of the regional conditions in mountain areas of eastern Colombian habitats, we analyzed the reports of Bogotá wetlands (Echeverry-Galvis 2015), the Bogotá Protective Forest Reserve (BOBPFR; Peraza 2011), and the Chingaza National Natural Park (Linares-Romero et al. 2017). Our study is the first inventory of birds for the ESNR, PJDNR, and Aguablanca wetland.

Results

We observed 128 species of birds belonging to 37 families. Through systematic sampling, we recorded 102 species, of which 89 (69% of the total) were exclusively from ESNR. The families with highest richness were Tyrannidae (15 spp.), Parulidae (10 spp.), and Thraupidae (10 spp.). Our study reports eight species that were not previously reported from northeastern Bogotá Savannah:

Table 1. Checklist of bird species of northeast of Bogotá Savannah. *Species only in Parque Jaime Duque Nature Reserve; ** Species not recorded in PNN Chingaza; °Species not recorded in Bosque Oriental from Bogotá Protective Forest Reserve; ♦Species not recorded in Bogotá wetlands. S: Sesquilé, T: Tocancipá, %O: percentage of occurrences.

Taxon name	English name	UICN	Xeno-canto records	Locality		Percentage occurrence			
				S	T	2016	2017	2018	2019
Anseriformes									
Anatidae									
Spatula discors (Linnaeus, 1766)**°♦	Blue-winged Teal	LC	XC501464	X	X	60	100	100	100
Anas andium (Conover, 1941)°♦	Andean Teal	LC			X	—	—	8.3	—
Oxyura jamaicensis andina (Gmelin 1789)°♦	Ruddy Duck	LC			X	—	60	100	100
Galliformes									
Cracidae									
Penelope montagnii (Bonaparte, 1756)♦	Adean Guan	LC			X*	—	—	—	—
Odontophoridae									
Colinus cristatus (Linnaeus, 1758)**♦	Crested Bobwhite	LC		X	X	—	8.3	—	—
Podicipediformes									
Podicipedidae									
Podilymbus podiceps (Linnaeus, 1758)**°♦	Pied-billed Grebe	LC	XC575479		X	—	66.6	100	100
Columbiformes									
Columbidae									
Columba livia Linnaeus, 1758**°♦	Rock dove	LC			X	—	—	8.3	—
Patagioenas fasciata (Say, 1822)♦	Northern Band-tailed Pigeon	LC		X	X*	—	—	—	—
Zenaida auriculata (Des Murs, 1847)♦	Eared Dove	LC		X	X	100	100	100	100
Cuculiformes									
Cuculidae									
Crotophaga major Gmelin, 1788**°♦	Greater Ani	LC			X	—	—	8.3	—
Coccyzus americanus (Linnaeus, 1758)	Yellow-billed Cuckoo	LC		X	X	—	8.3	8.3	—
Caprimulgiformes									
Caprimulgidae									
Chordeiles minor (Forster, 1771)°	Common Nighthawk	LC			X	—	8.3	8.3	8.3
Systellura longirostris (Bonaparte, 1825)°♦	Band-winged Nightjar	LC			X	—	—	8.3	8.3
Apodiformes									
Trochilidae									
Colibri coruscans (Gould, 1846)♦	Sparkling Violetear	LC	XC446943	X	X	75	91.6	91.6	91.6
Lesbia nuna (Lesson, 1832)♦	Green-tailed Trainbearer	LC	XC582123	X	X	—	—	8.3	8.3
Eriocnemis vestita (Lesson, 1839)♦	Glowing Puffleg	LC		X	X	—	—	—	—
Aglaeactis cupripennis (Bourcier, 1843)°♦	Shining Sunbeam	LC		X		—	—	—	—
Chaetocercus mulsant (Bourcier, 1843)♦	White-bellied Woodstar	LC			X	—	—	8.3	—
Gruiformes									
Rallidae									
Rallus semiplumbeus P.L. Scatler, 1856	Bogotá Rail	EN	XC506788		X	—	—	—	8.3
Porphyrio martinica (Linnaeus, 1766)**°♦	Purple Gallinule	LC			X	—	8.3	8.3	8.3
Mustelirallus erythrops (P.L. Sclater, 1867)**°♦	Paint-billed Crake	LC			X	—	8.3	—	—
Porphyriops melanops bogotensis (Vieillot, 1819)**°♦	Spot-flanked Gallinule	LC	XC470011		X	8.3	100	100	100
Porzana carolina (Linnaeus, 1758)°	Sora	LC			X	8.3	16.6	16.6	16.6
Gallinula galeata (Lichtenstein, 1818)°♦	Common Gallinule	LC			X	63.6	100	100	100
Fulica americana Gmelin, 1789°♦	American Coot	LC	XC575486		X	63.6	100	100	100
Charadriiformes									
Charadriidae									
Vanellus chilensis (Molina, 1782)°♦	Southern Lapwing	LC	XC460550		X	63.6	100	100	100
Charadrius vociferus Linnaeus, 1758**°♦	Killdeer	LC	XC460580		X	63.6	100	100	100
Scolopacidae									
Bartramia longicauda (Bechstein, 1812)**°	Upland Sandpiper	LC			X	—	—	—	8.3
Calidris melanotos (Vieillot, 1819)	Pectoral Sandpiper	LC			X	—	—	—	8.3
Gallinago nobilis P.L. Scater, 1856°♦	Noble Snipe	NT	XC558706		X	63.6	100	100	100
Actitis macularius (Linnaeus, 1766)°	Spotted Sandpiper	LC			X	18.2	50	50	50
Tringa solitaria Wilson, 1813°	Solitary Sandpiper	LC	XC460565		X	36.6	41.6	41.6	41.6
Tringa melanoleuca (Gmelin, 1789)°	Greater Yellowlegs	LC			X	8.3	8.3	8.3	8.3
Tringa flavipes (Gmelin, 1789)°	Lesser Yellowlegs	LC			X	25	25	25	25
Jacanidae									
Jacana jacana (Linnaeus, 1766)**°♦	Wattled Janaca	LC			X	—	8.3	—	—
Laridae									
Phaetusa simplex (Gmelin, 1789)**°♦	Large-billed Tern	LC			X	—	8.3	8.3	—
Suliformes									
Phalacrocoracidae									
Phalacrocorax brasilianus (Gmelin, 1789)**°♦	Neotropic Cormorant	LC			X	—	91.6	91.6	50

Taxon name	English name	UICN	Xeno-canto records	Locality		Percentage occurrence			
				S	T	2016	2017	2018	2019
Pelecaniformes									
Ardeidae									
Nycticorax nycticorax (Linnaeus, 1758)°♦	Black-crowned Night-heron	LC			X	8.3	8.3	8.3	8.3
Butorides striata (Linnaeus, 1758)**°♦	Striated Heron	LC			X	45.5	66.6	66.6	91.7
Bubulcus ibis (Linnaeus, 1758)°♦	Cattle Egret	LC		X	X	100	100	100	100
Ardea alba Linnaeus, 1758°♦	Great Egret	LC			X	54.5	83.3	83.3	100
Syrigma sibilatrix (Temminck, 1824)°♦		LC			X	—	—	8.3	8.3
Egretta caerulea (Linnaeus, 1758)°	Little Blue Heron	LC			X	8.3	8.3	8.3	8.3
Threskiornithidae									
Phimosus infuscatus (Lichtenstein, 1823)°♦	Bare-faced Ibis	LC			X	—	—	16.6	41.7
Cathartiformes									
Cathartidae									
Coragyps atratus (Bechstein, 1793)♦	Black Vultutre	LC		X	X	75	75	75	41.7
Pandionidae									
Pandion haliaetus (Linnaeus, 1758)°	Osprey	LC			X	8.3	8.3	8.3	—
Accipitriformes									
Accipitridae									
Elanus leucurus (Vieillot, 1818)♦	White-tailed Kite	LC		X	X	91.6	91.6	91.6	58.3
Elanoides forficatus (Linnaeus, 1758)°♦	Swallow-tailed Kite	LC			X*	—	—	—	—
Accipiter striatus Vieillot, 1808**°♦	Sharp-shinned Hawk	LC		X		—	—	—	—
Rupornis magnirostris (J.F. Gmelin, 1788)°♦	Roadside Hawk	LC	XC461499	X	X	75	75	75	83.3
Buteo platypterus (Vieillot, 1823)	Broad-winged-Hawk	LC			X	8.3	8.3	8.3	8.3
Buteo swainsoni Bonaparte, 1838°	Swaison's Hawk	LC			X	8.3	8.3	8.3	8.3
Strigiformes									
Tytonidae									
Tyto alba (*Scopoli*, 1769)°♦	Barn Owl	LC		X	X	—	—	100	100
Strigidae									
Megascops choliba (Vieillot, 1817)°♦	Tropical Screech-Owl	LC			X	—	—	8.3	8.3
Asio clamator (Vieillot, 1808)**°♦	Striped Owl	LC			X	—	8.3	8.3	8.3
Asio flammeus bogotensis Chapman, 1915**°♦	Short-eared Owl	LC			X	—	16.6	16.6	16.6
Piciformes									
Picidae									
Dryobates fumigatus (d'Orbigny, 1840)♦	Smoky-brown Woodpecker	LC			X*	—	—	—	—
Colaptes rivolii (Boissonneau, 1840)°♦	Crimson-mantled Woodpecker	LC		X		—	—	—	—
Falconiformes									
Falconidae									
Caracara cheriway (Jacquin, 1784)**°♦	Crested caracara	LC			X	—	—	—	16.6
Falco sparverius Linnaeus, 1758°♦	American Kestrel	LC		X	X	—	25	41.6	25
Falco columbarius Linnaeus, 1758°♦	Merlin	LC			X	—	—	8.3	16.7
Falco peregrinus Tunstall, 1771**°	Peregrine Falcon	LC			X	—	—	33.3	66.6
Psittaciformes									
Psittacidae									
Forpus conspicillatus (Lafresnaye, 1848)°♦	Spectacled Parrotlet	LC			X	—	—	8.3	—
Grallariidae									
Grallaria squamigera Lafresnaye, 1842°♦	Undulated Antpitta	LC		X		—	—	—	—
Grallaria ruficapilla Lafresnaye, 1842♦	Chestnut-crowned Antpitta	LC		X		—	—	—	—
Grallaria rufula Lafresnaye, 1843°♦	Rufous Antpitta	LC		X		—	—	—	—
Rhinocryptidae									
Scytalopus griseicollis (Lafresnaye,1840)♦	Pale-bellied Tapaculo	LC			X*	—	—	—	—
Furnariidae									
Synallaxis subpudica P.L. Sclater, 1874♦	Silvery-throated Spinetail	LC	XC462131		X	—	—	8.3	—
Tyrannidae									
Pyrrhomyias cinnamomeus (d'Orbigny & Lafresnaye, 1837)♦	Cynnamon Flycatcher	LC		X		—	—	—	—
Elaenia frantzii Lawrence, 1865°♦	Mountain Elaenia	LC		X	X*	—	—	—	—
Mecocerculus leucophrys (d'Orbigny & Lafresnaye, 1837)♦	White-throated Tyrannulet	LC	XC465233	X	X	—	8.3	8.3	8.3
Serpophaga cinerea (Tschudi, 1844)**°♦	Torrent Tyrannulet	LC			X	—	—	—	8.3
Machetornis rixosa (Vieillot, 1819)**°♦	Cattle Tyrant	LC			X	—	—	8.3	8.3
Myiodynastes luteiventris (Sclater, 1859)**°	Sulphur-belled Flycatcher	LC			X	—	—	8.3	8.3
Tyrannus melancholicus Vieillot, 1819°♦	Tropical Kingbird	LC		X	X	83.3	83.3	83.3	83.3
Tyrannus savana Daudin, 1802°♦	Fork-tailed Flycatcher	LC		X	X	—	25	25	25
Tyrannus tyrannus (Linnaeus, 1758)	Eastern Kingbird	LC			X	—	16.6	16.6	16.6
Myiarchus crinitus (Linnaeus, 1758)**°	Great Crested Flycatcher	LC			X	—	8.3	8.3	—
Pyrocephalus rubinus (Baddaert, 1783)**°♦	Vermillion Flycatcher	LC			X	—	—	—	—
Sayornis nigricans (Swainson, 1827)°♦	Black Phoebe	LC			X	8.3	8.3	8.3	16.7
Contopus cooperi (Nuttall, 1831)°	Olive-sided Flycatcher	NT			X	—	—	8.3	—
Contopus virens (Linnaeus, 1766)**°	Eastern Wood-Pewee	LC			X	—	25	25	25

Taxon name	English name	UICN	Xeno-canto records	Locality		Percentage occurrence			
				S	T	2016	2017	2018	2019
Vireonidae									
Vireo olivaceus (Linnaeus, 1766)**°	Red-Eyed Vireo	LC			X	—	8.3	16.6	33.3
Hirundinidae									
Orochelidon murina (Cassin, 1853)♦	Brown-bellied Swallow	LC		X	X	91.6	100	100	100
Progne tapera (Linnaeus, 1766)°	Brown-chested Martin	LC			X	—	—	25	8.3
Progne subis (Linnaeus, 1758)**°♦	Purple Martin	LC			X	—	—	8.3	—
Riparia riparia (Linnaeus, 1758)°	Bank Swallow	LC			X	25	25	25	25
Hirundo rustica Linnaeus, 1758	Barn Swallow	LC			X	25	25	25	25
Petrochelidon pyrrhonota (Vieillot, 1817)**°	Cliff Swallow	LC			X	16.6	16.6	16.6	16.6
Troglodytidae									
Troglodytes aedon Vieillot, 1809♦	House Wren	LC		X	X	81.8	100	100	100
Turdidae									
Catharus ustulatus (Nuttall, 1840)	Russet-backed Thrush	LC			X	—	—	8.3	8.3
Turdus fuscater d'Orbigny & Lafresnaye, 1837♦		LC		X	X	90.9	100	100	100
Mimidae									
Mimus gilvus (Vieillot, 1808)°♦	Tropical Mockingbird	LC	XC579873	X	X	—	66.6	66.6	83.3
Fringillidae									
Spinus spinescens (Bonaparte, 1850)°♦	Andean Siskin	LC			X	100	100	100	100
Spinus psaltria (Say, 1822)**°♦	Lesser Goldfinch	LC		X	X	75	75	75	75
Passerellidae									
Arremon assimilis (Boissonneau, 1840)°♦	Grey-browed Brush Finch	NE	XC465062		X*	—	—	—	—
Zonotrichia capensis (Statius Müller, 1776)♦	Rufous-collared Sparrow	LC	XC446944	X	X	100	100	100	100
Atlapetes schistaceus (Boissonneau, 1840)♦	Slaty Brush-finch	LC		X	X*	—	—	—	—
Atlapetes pallidinucha (Boissonneau, 1840)♦	Pale naped Brush-finch	LC	XC465239	X	X*	—	—	—	—
Icteridae									
Sturnella magna (Linnaeus, 1758)♦	Eastern Meadowlark	NT	XC461497	X	X	100	100	100	100
Icterus chrysater (Lesson, 1844)°♦	Yellow-backed oriole	LC		X	X	8.3	8.3	8.3	8.3
Molothrus bonariensis (Gmelin, 1789)**°♦	Shiny Cowbird	LC			X	91.6	91.6	91.6	75
Quiscalus lugubris Swainson, 1838**°♦	Carib Grackle	LC			X	—	8.3	8.3	8.3
Gymnomystax mexicanus (Linnaeus, 1766)°♦	Oriole Blackbird	LC	XC572491		X	—	—	8.3	—
Chrysomus icterocephalus bogotensis (Linnaeus, 1766)**°♦	Yellow-hooded Blackbird	LC	XC513503		X	63.6	91.6	91.6	91.6
Parulidae									
Parkesia noveboracensis (Gmelin, 1789)**°♦	Northern waterthrush	LC			X	—	—	—	8.3
Protonotaria citrea (Boddaert, 1783)**°	Prothonotary warbler	LC			X	—	—	—	8.3
Leiothlypis peregrina (Wilson, 1811)**°	Tennessee Warbler	LC			X	—	—	8.3	8.3
Geothlypis philadelphia (Wilson, 1810)°	Mourning Warbler	LC			X	—	—	8.3	8.3
Setophaga ruticilla (Linnaeus, 1758)°	American Redstart	LC			X	—	8.3	8.3	8.3
Setophaga cerulea (Wilson, 1810)°	Cerulean Warbler	NT			X	—	8.3	—	—
Setophaga fusca (Müller, 1776)°	Blackburnian Warbler	LC			X	—	8.3	8.3	8.3
Setophaga petechia (Linnaeus, 1766)°	Yellow Warbler	LC			X	—	—	8.3	8.3
Myiothlypis nigrocristata (Lafresnaye, 1840)°♦	Black-crested Warbler	LC	XC484799		X*	—	—	—	—
Cardellina canadensis (Linnaeus, 1766)°	Canada Warbler	LC			X	—	8.3	8.3	8.3
Cardinalidae									
Piranga rubra (Linnaeus, 1758)°	Summer Tanager	LC			X	—	8.3	8.3	8.3
Piranga olivacea (Gmelin, 1789)**°	Scarlet Tanager	LC			X	—	8.3	8.3	8.3
Pheucticus aureoventris (d'Orbigny & Lafresnaye, 1837)**°♦	Black-backed Grosbeak	LC			X*	—	—	—	—
Thraupidae									
Conirostrum rufum Lafresnaye, 1843♦	Rufous-browed Conebill	LC			X*	—	—	—	—
Sicalis flaveola (Linnaeus, 1766)**°♦	Saffron Finch	LC			X	—	8.3	8.3	16.7
Sicalis luteola bogotensis Sparrman, 1789**°♦	Grassland Yellow-finch	LC	XC513507	X	X	100	100	100	91.7
Diglossa humeralis (Fraser, 1840)♦	Black Flowerpiercer	LC	XC465249	X	X	—	—	8.3	8.3
Diglossa sittoides (d'Orbigny & Lafresnaye, 1837)**°♦	Rusty Flowerpiercer	LC			X	8.3	8.3	8.3	8.3
Sporophila luctuosa (Lafresnaye, 1843)**°♦	Black-and-white Seedeater	LC		X		—	—	—	—
Pipraeidea melanonota (Vieillot, 1819)♦	Fawn-breasted Tanager	LC			X*	—	—	—	—
Dubusia taeniata (Boissonneau, 1840)♦	Buff-breasted Mountain-Tanager	LC			X*	—	—	—	—
Anisognathus igniventris (d'Orbigny & Lafresnaye, 1837)♦	Fire-bellied Mountain-tanager	LC		X		—	—	—	—
Thraupis episcopus (Linnaeus, 1766)°♦	Blue-gray Tanager	LC			X	—	8.3	8.3	8.3

Bartramia longicauda (Bechstein, 1812), *Caracara cheriway* Jacquin, 1784, *Charadrius vociferus* Linnaeus, 1758, *Myiodynastes luteiventris* Sclater, 1859, *Progne subis* Linnaeus, 1758, *Progne tapera* Linnaeus, 1766, *Setophaga cerulea* (Wilson, 1810), and *Syrigma sibilatrix* Temminck, 1824.

Zenaida auriculata (Des Murs, 1847), *Bubulcus ibis* (Linnaeus, 1758), *Spinus spinescens* (Bonaparte, 1850), *Zonotrichia capensis* (Müller, 1776), and *Sturnella magna* (Linnaeus, 1758) were recorded in all samples from 2016 to 2019. *Spatula discors* (Linnaeus, 1766), *Porphyriops melanops bogotensis* (Vieillot, 1819),

Gallinula galeata (Lichtenstein, 1818), *Fulica americana* (Gmelin, 1789), *Vanellus chilensis* (Molina, 1782), *Charadrius vociferus* (Linnaeus, 1758), *Gallinago nobilis* P.L. Scater, 1856, *Orochelidon murina* (Cassin, 1853), *Troglodytes aedon* Vieillot, 1809, and *Turdus fuscater* d'Orbigny & Lafresnaye, 1837 were recorded in all samples from 2017 to 2019.

We found that IUCN categorizes 122 spp. as Least Concern, and four species as Near Threatened. In the latter category are *Gallinago nobilis*, *Sturnella magna*, *Contopus cooperi* Nuttall, 1831, and *Setophaga cerulea* (Wilson, 1810). *Rallus semiplumbeus* is categorized as Endangered. *Arremon assimilis* (Boissonneau, 1840) has not been evaluated (Table 1). Information on these species and some natural history aspects are provided below. We also present some noteworthy records that include rarely seen species, migrants with few records, and important species that arrived after the restoration actions in the ESNR.

New records from the northeastern Bogotá Savannah

***Bartramia longicauda* (Bechstein, 1812)**
Figure 4A

New records. One male foraging in the flooded grassland of the ESNR (04°56′52″N, 073°57′47″W) on 15 June 2016. One male foraging around the wetlands of the ESNR (04°56′50″N, 073°57′16″W) on 14 January 2017. One male foraging on the beach of the wetlands of the ESNR (04°56′55″N, 073°57′22″W) on 19 January 2018. We recorded this species in the systematic survey on 17 January 2019.

Identification. Individuals brown mottled, with long neck, small head, and large eyes.

Remarks. We did not record any reproductive events. This species is a boreal migratory bird.

Distribution. Canada to Argentina.

***Caracara cheriway* Jacquin, 1784**
Figure 4B

New records. One adult perching in *Pinus* sp. in an exotic forest on the border of the ESNR (04°56′43″N, 073°57′32″W) on 15 June 2016. One individual flying and foraging on the grassland of the ESNR (04°56′52″N, 073°57′47″W) on 14 January 2017. One individual flying and foraging on the grassland of the ESNR (04°56′48″N, 073°57′14″W) on 19 June 2018. We recorded this species in the systematic survey on 17 January and 15 Feb. 2019.

Identification. Similar to a hawk, with sharp beak and claws. The body is black with white and strongly yellow (adult) or grey (young) legs. The dorsal region of the head is black, contrasting with the white neck and the yellow-orange face. Young individuals tend to be brown but darken to black with age.

Remarks. We did not record any reproductive events.

Distribution. Florida and southwestern USA, Caribbean, and Central America, south to northern South America.

***Charadrius vociferus* Linnaeus, 1758**
Figure 4C–E

New records. Five individuals foraging and vocalizing on the open grounds and grasslands of the ESNR (04°56′52″N, 073°57′47″W) on 15 June 2016. One individual flying over the grasslands of the ESNR (04° 56′58″N, 073°57′33″W) on 17 September 2019. We recorded this species in all the samples of the systematic survey since 19 January 2017.

Identification. Male brown on the back and white ventrally, with two black bands on the chest and black and white spots on the face. Immature individuals with attenuated or incomplete pectoral bands and light red eye rings. Tibial feathers with presence of down. Light brown on edge of wing coverts.

Remarks. We observed three immature individuals, which were flightless and likely less than 30 days. On 21 May, we recorded a nest with two eggs (35.4 mm × 26.1 mm) and a chick on 27 May 2018. We also observed three 10-day-old chicks.

Distribution. Canada to northern Colombia, northwestern Venezuela, and western Ecuador and Peru.

***Myiodynastes luteiventris* P.L. Sclater, 1859**
Figure 4F

New records. One individual perching on a tree crown in the exotic forest of the ESNR (04°56′52″N, 073°57′47″W) on 15 June 2016. One individual perching on *Smallanthus*

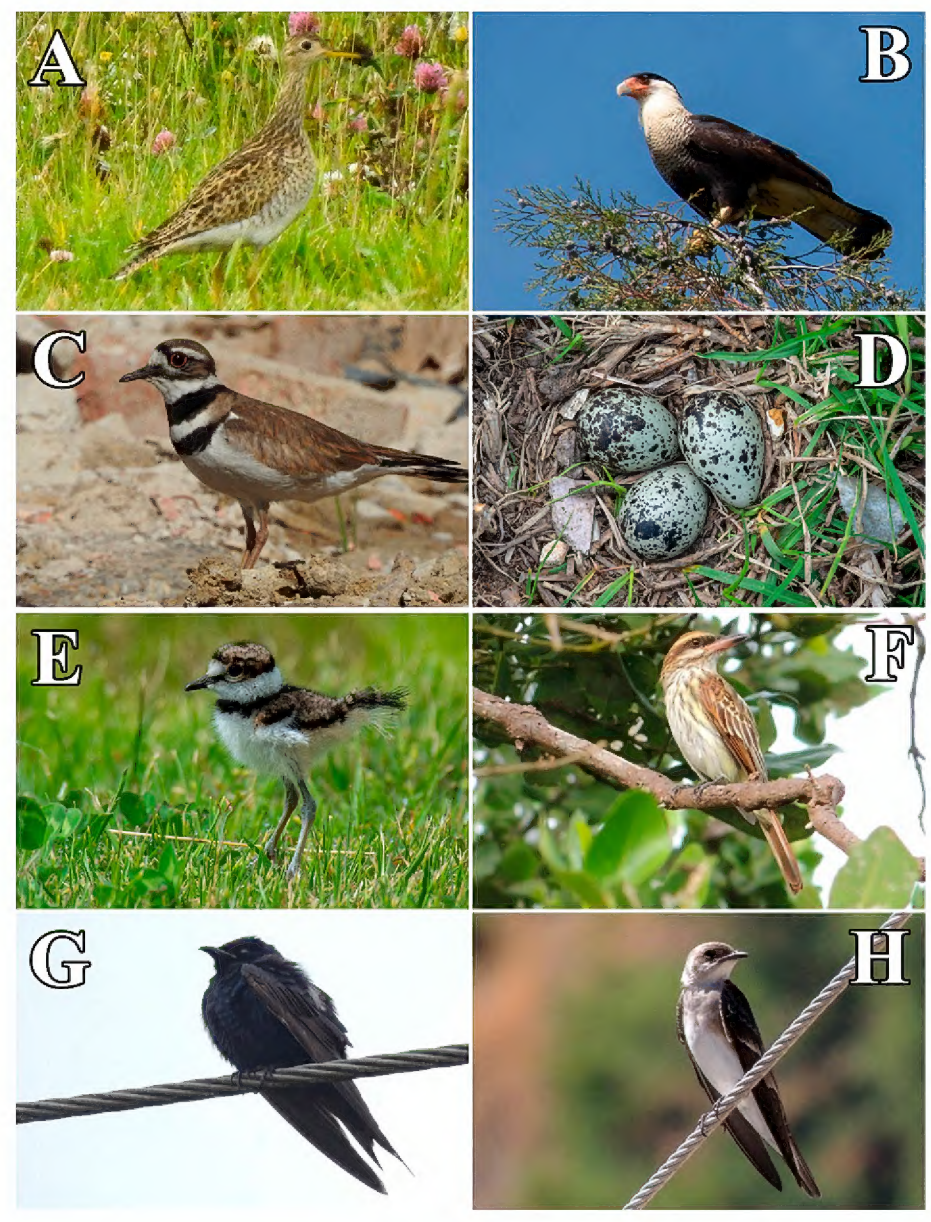

Figure 4. New records from the Bogotá region. **A.** *Bartramia longicauda*. **B.** *Caracara cheriway*. **C.** *Charadrius vociferus* **D.** Breeding evidence of the migratory bird *C. vociferus*. **E.** *C. vociferus* chick. **F.** *Myiodynastes luteiventris*. **G.** *Progne subis* male. **H.** *P. tapera*.

pyramidalis (Triana) H. Rob. in the growing native forest of the ESNR (04°56′57″N, 073°57′20″W) on 14 January 2017. We recorded this species in systematic surveys on 17 January 2018 and on 19 January 2019.

Identification. White eyebrows and whiskers. Glossy ruffle tail and yellowish chest with black lines and blackish whiskers.

Remarks. We did not record any reproductive events. This species has rarely been seen in Colombia and in the Bogotá Savannah. This is a boreal migratory species.

Distribution. Southeastern Arizona (USA), northeastern Mexico, south to Costa Rica and western Amazonia in South America.

***Progne subis* Linnaeus, 1758**

Figure 4G

New records. Three males flying above the wetlands of the ESNR (04°56′52″N, 073°57′47″W) on 15 January 2016. Two male flying above the artificial water bodies in the Jaime Duque Park (04°56′47″N, 073°57′41″W), 14 January 2017. One male perching on electrical wires around artificial water bodies in the Jaime Duque Park (04° 56′40″N, 073°57′33″W) on 17 January 2019. We recorded this species in systematic surveys on 15 October 2018.

Identification. Male with lustrous blue body. Female and immature with greyish front, purple-brown back on head and wings, greyish brown throat and chest, grey sides of neck and nape with darker cheek, and white bottoms, striated with brown.

Remarks. We did not record any reproductive events. This species is a boreal migratory bird.

Distribution. Eastern and central USA to southeastern Brazil.

***Progne tapera* Linnaeus, 1766**

Figure 4H

New records. Four individuals flying above the wetlands of the ESNR (04°56′52″N, 073°57′47″W) on 05 January 2018. One individual perching on electrical wires and five individuals flying above the wetlands in the ESNR (04°56′45″N, 073°57′24″W). We recorded this species systematically for the first time on 17 January 2018, and since then we have observed it between September and December and April and May.

Identification. Large broad-winged swallow; grey-brown back with blackish front and helms, white ventral region with grey-brown broadband and a longitudinal line of fusca spots; white and long infracaudal covers contrast with the dark grey tail; immature grayer and without a marked longitudinal line.

Remarks. We did not record any reproductive events. This species is an austral migratory bird.

Distribution. Panama to Argentina.

***Setophaga cerulea* (Wilson, 1810)**

New records. One male perching on *Sambucus* sp. in the growing native forest of the ESNR (04°56′52″N, 073°57′47″W) on 14 January 2016. One male foraging near *Eucalyptus* sp. in the exotic forest in the ESNR (04° 56′59′N, 073°57′22″W) on 17 January 2019. We recorded this species in systematic surveys on 17 January 2017.

Identification. Adult males with cerulean blue dorsal region, blackish wings with two white wing bars; back striated with black; white ventral region with narrow black pectoral collar and blackish striatum on the sides. Female and immature with olive-green back and blue on the crown; narrow superciliary and two white wing bars; opaque white ventral region with dark brown striatum on the lateral sides.

Remarks. We did not record any reproductive events. This species is a boreal migratory bird. It is categorized as Near Threatened (BirdLife International 2019). This species has undergone a population decline of 72% over the last 44 years in North America (Rosenberg et al. 2016).

Distribution. Eastern USA and Central America, Panama, northern Venezuela, northern and central Colombia, Ecuador, Peru, and northern Bolivia.

***Syrigma sibilatrix* Temminck, 1824**

New records. Two individuals foraging on the edge of the wetlands in the ESNR (04°56′52″N, 073°57′47″W) on 15 June 2016. One individual foraging among the aquatic vegetations in the wetlands of the ESNR (04°57′01″N, 073°57′17″W) on 14 June 2017. We recorded this species in systematic surveys on 17 January 2017 and on 15 September 2018.

Identification. Black crown, sides of the head, neck, and chest; scapular area suede coloured.

Remarks. We did not record any reproductive events.

Distribution. Llanos grasslands of Venezuela and eastern Colombia; southeastern South America, from the Pantanal of Bolivia south to southeastern Brazil, Uruguay, and northeastern Argentina.

Endangered and Near Threatened species

***Rallus semiplumbeus* P.L. Scatler, 1856**

Figure 5A

New records. One individual was heard and seen, hiding among the aquatic vegetations in the wetlands of the ESNR on 2 June 2019. We recorded this species in the systematic surveys on 17 June 2019.

Identification. Males and females have a long, bright red bill and red tarsi, upperparts olive brown, streaked with black or dusky, wings chestnut, sides of the head, neck, and the breast and upper belly are gray, flanks and lower belly are barred black and white.

Remarks. We did not record any reproductive events. The species is very rare in the Bogotá Savannah. It is categorized as Endangered because its range is very small and is contracting owing to widespread habitat loss and degradation (Birdlife International 2016).

Distribution. This species is reported to eastern Andes of Colombia only.

Gallinago nobilis P.L. Scater, 1856

Figure 5B, C

New records. Several adults and chicks have been seen flying and foraging in the flooded grasslands of the ESNR. We recorded this species in all samples of the systematic surveys since 13 April 2017.

Identification. Beak long, up to twice the length of the head. Body speckled with black, with darker neck and chest. Central region of the belly white.

Remarks. We saw courtship behavior at the beginning of May and until the end of June 2018. We found three active nests (27 May, 12 June, and 9 July 2018) in flooded grassland, each with two eggs (47.1 mm × 33.6 mm). This species is mainly threatened by habitat degradation (Birdlife International 2018), and the populations in and around Bogotá have undergone a slight reduction in abundance over the last two decades as a result of a reduction in the availability of shoreline in wetlands due to invasive macrophytes (Stiles et al. 2017). The presence of this species in protected areas in Ecuador (Cisneros-Heredia 2006) and Chingaza Natural National Park, Colombia (Linares-Romero et al. 2017), and now in ESNR and PJDNR, where macrophyte invasion is under control, may help increase populations of this bird species.

Distribution. Southwestern Venezuela to southern Ecuador.

Sturnella magna Linnaeus, 1758

Figure 5D

New records. Several adults and chicks have been heard and seen, hiding in the grasslands of the ESNR. We recorded this species in systematic surveys in all the samples since the beginning of our study.

Identification. Adults with a sturdy body, long pointed beak, long legs, and short tail; head with broad blackish and whitish brown lists; the dorsal region is dark-brown, barred with black; throat, chest, and belly bright yellow with a black V-shaped spot; ventral region dark, mottled brown in young birds.

Remarks. On 10 July 2018, we observed a nest with three chicks devoid of feathers and down and with closed eyes. On 31 October 2018, we recorded a nest with three eggs (27.74 mm × 20.11 mm). The species is threatened by agricultural activities (use of pesticides and herbicides) and livestock. However, the population trend is currently increasing (Birdlife International 2018). In Bogotá and its surroundings, populations have been undergoing a reduction in their abundance as a result of the loss of grasslands for housing and exotic flower crops (Stiles et al. 2017). As part of the conservation strategy for this species, grassland areas without contaminants where the species can nest can be increased (Jaster et al. 2012).

Distribution. North and Central America and northeastern South America.

Figure 5. Birds of Bogotá's Savannah. **A.** *Rallus semiplumbeus*. **B.** *Gallinago nobilis*. **C.** Breeding evidence of *G. nobilis* in ESNR. **D.** *Sturnella magna*.

Contopus cooperi Nuttall, 1831

New records. One individual was perching on the treetop of a very conspicuous *Eucalyptus* sp. We recorded this species in systematic surveys on 4 April 2018.

Identification. *Contuopus cooperi* is the largest of the pewees, with heavy grayish markings on the sides as if the bird is wearing a waistcoat.

Remarks. We did not record any reproductive events. This species is a boreal migratory bird. It is threatened by logging and pollution from agricultural activities (Birdlife International 2017), as well as loss and alteration of its habitat (Altman 1997). The populations in and around Bogotá have been unchanged over the past 20 years (Stiles et al. 2017).

Distribution. Canada to northern Bolivia and Brazil.

Other noteworthy records

Anas andium Conover, 1941

Figure 6A

New records. Three individuals were inside a flock of *Spatula discors* in the wetlands of the ESNR. We recorded this species in systematic surveys on 19 December 2018.

Identification. This teal species is similar to the female of *Spatula discors* (Blue-winged Tail), but darker, with green speculum and orange lower secondary covers.

Remarks. We did not record any reproductive events.

Distribution. Andes of southwestern Venezuela, Colombia, Ecuador, and northern Peru. In Colombia, east of the Andes to Bogotá, between 2,600 and 4,300 m a.s.l.

Oxyura jamaicensis andina Gmelin, 1789

Figure 6B–D

New records. One male and one female swimming in the wetlands of the ESNR on 21 June 2017. We recorded this species in all systematic surveys since 16 July 2017.

Identification. Small and chubby duck with an upward turned tail. Male has black head and neck with a varied amount of white on the cheek. Bill light blue. Female blackish.

Remarks. We recorded three reproductive events. Th first event was on 25 May 2018, with five chicks; the second event was on 6 June 2018, with four chicks; and the last event occurred on 20 September 2018, when we found one nest with four eggs (68.3 mm × 48.1 mm).

Distribution. North America, Mexico, and Colombia. In South America, northern Andean mountains to southern Argentina and Chile. In Colombia at elevations between 2,500 and 4,000 m a.s.l.

Spatula discors Linnaeus, 1766

Figure 6E–H

New records. One female was walking on flooded grasslands of the ESNR on 24 June 2016. We recorded this species in all systematic surveys since 17 July 2016.

Identification. Males with grey head and white crescent on the face and flanks. The covering feathers make blue patches. Females with mottled brown head and neck, but without half-moon.

Remarks. We recorded a female and eight chicks swimming in a wetland in the ESNR on 30 July 2016. Between 21 April and 12 June 2018, we recorded 11 active nests with an average of 11 eggs (45.5 mm × 33 mm), of which 83% of chicks hatched, a high value compared to 35% reported by Glover (1956). A boreal migratory species.

Distribution. North America through Central America to northern South America, Uruguay, Argentina, and Chile.

Lesbia nuna Lesson, 1832

Figure 7A

New records. One male and one female sucking flower nectar of *D. mutisii* and *Streptosolen jamesonii* (Benth.) Miers in the native forest in ESNR on 20 October 2018. We recorded this species in systematic surveys on 16 December 2018 and on 15 April 2019.

Identification. Male bright green male ventrally; tail length approximately twice the length of the body; black helms and their distal half bright green. Females with bright green spots on white ventral region and shorter tail than in males.

Remarks. We did not record any reproductive events. The species was rare in our study.

Distribution. Colombia, Ecuador, and Peru.

Buteo platypterus Vieillot, 1823

Figure 7B, C

New records. About 1,500 individuals were recorded in a boreal migration flying above the ESNR and PJDNR on 7 April 2018. The flock included *Buteo platypterus* and *B. swainsoni* Bonaparte, 1838. We recorded this species in systematic surveys in November of each year.

Identification. Adult and immature individuals show differences in plumage. Adults have dark brown on the dorsum and barred chest. Immatures are similar on dorsum, but the chest is whitish with brown stripes.

Remarks. We did not record any reproductive events. This species is a boreal migratory bird.

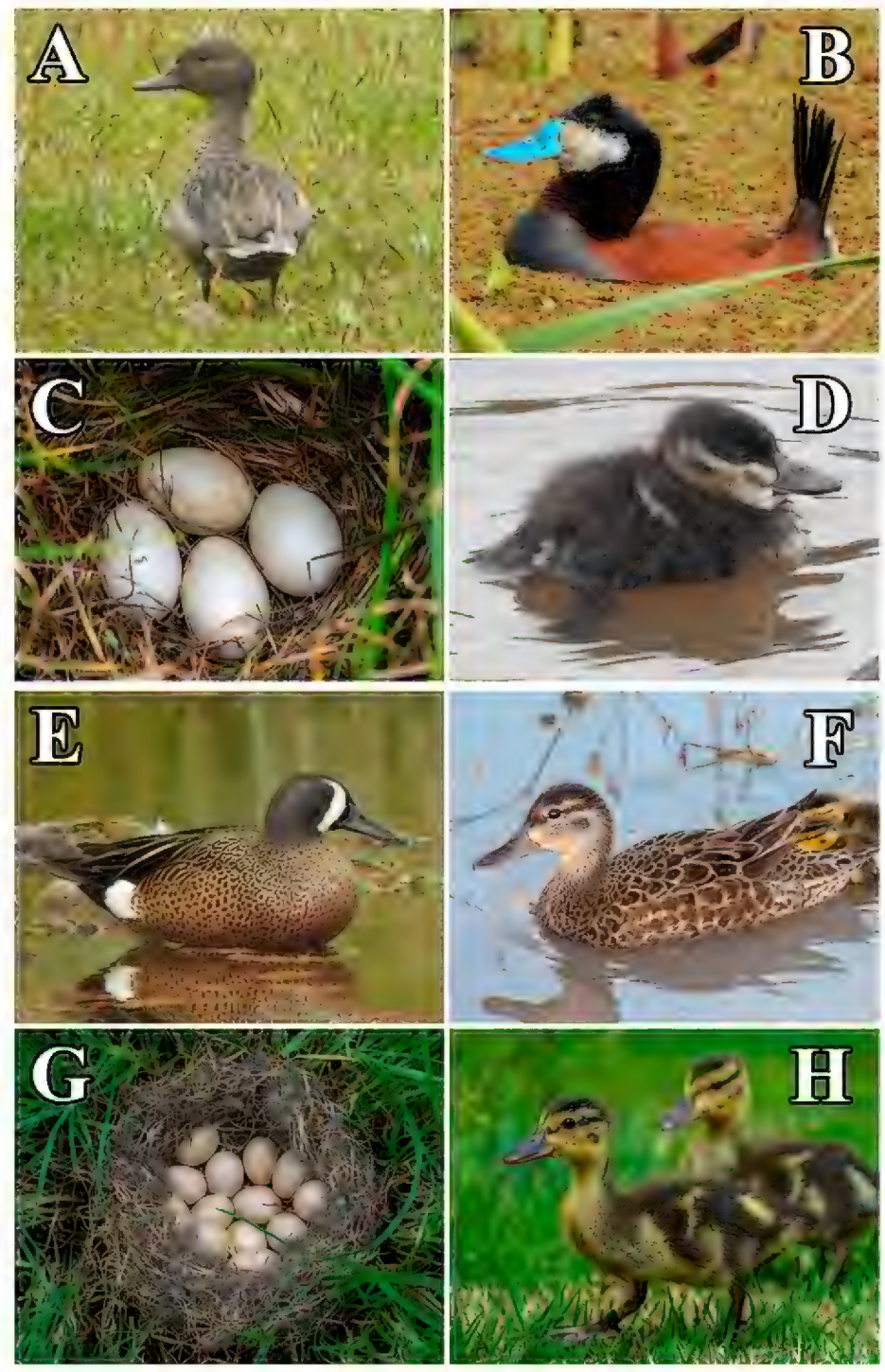

Figure 6. Birds of Bogotá's Savannah. **A.***Anas andium*. **B.** *Oxyura jamaicensis andina* male. **C.** Breeding evidence of *O. jamaicensis andina* in ESNR, nest and eggs. **D.** *O. jamaicensis andina* chick. **E.** *Spatula discors* male. **F.** *S. discors* female. **G.** Breeding evidence of migratory bird *S. discors* in ESNR, nest and eggs, **H.** *S. discors* chicks.

Distribution. USA, Canada, Mexico, Central America, northwestern South America to western Ecuador, Bolivia, and northwestern Brazil.

Elanoides forficatus Linnaeus, 1758

New records. Three individuals flying over PJDNR on 12 June 2016.

Identification. The body is a contrast between deep black and white. The flight feathers, tail feet and bill are black. The tail is elongated and forked.

Remarks. We did not record any reproductive events. This species is a boreal migratory bird. We consider this species as an isolated record due to its unique record of three individuals. They could be wandering individuals of the subspecies *Elanoides forficatus yetapa* (Vieillot, 1818*)* resident in Colombia (Ayerbe-Quiñones 2018), being recorded at a time when the migration of birds from the north of the continent was not usual.

Distribution. Southeastern USA south through Central America and southern Brazil.

Falco peregrinus Tunstall, 1771

Figure 7D

Figure 7. Birds of Bogotá's Savannah. **A.** *Lesbia nuna* male, **B.** *Buteo platypterus*. **C.** Migratory flock of *B. platypterus* and *B. swainsoni*. **D.** *Falco peregrinus*. **E–H.** *Asio flammeus bogotensis*. **E.** Adult. **F.** Chicks and egg. **G.** Chick. **H.** Immature.

New records. Lonely individuals and couples have been seen perching and feeding on doves and pigeons in a replica building of the Taj Mahal. We recorded this species systematically between October 2018 and April 2019.

Identification. Dorsal region of the body is dark blue–grey, with the crown, nape and broad legs under the eye black. Atrial region, lateral areas and lower parts of the neck are white. Chest and belly in brown are barred, with brown tailed tail, grey blue and greyish white. Head sides, including black ears.

Remarks. We did not record any reproductive events. This species is a boreal migratory bird. It is a winter resident scarce in the Bogotá Savannah (ABO 2000).

Geographic distribution. Western North America, Central and South America.

Asio flammeus bogotensis Chapman, 1915

Figure 7E–H

New records. One individual perching on an artificial hanger of 2 m in the ESNR on 12 October 2017.We recorded this species systematically on 17 October 2017, 15 November 2017, 14 June 2018, 15 September 2018, 15 January 2019, 17 April 2019.

Identification. Owl with short ears, feathered legs and dark facial disc until black around the eyes. Whiskers, nostrils and brows are blackish dorsally. Tawny lists, beak, and black claws. During flight, it shows a black patch on the wrists and above it an extensive light coloured patch at the base of the front.

Remarks. On 16 July 2018. we recorded a nest with two chicks of 300 g and an egg with embryonic death (40.1 mm × 33.9 mm). The species was very common in open areas of the Bogotá Savannah, currently very rare (ABO 2000; Stiles et al. 2017).

Distribution. Colombia. Cosmopolitan distribution.

Fulica americana Gmelin, 1789

Figure 8A–D

New records. One individual swimming, four months after the increase of the open water habitat in the wetlands of the ESNR on 2 June 2016. We recorded this species systematically in all samples since 17 June 2016.

Identification. Short and thick beak (turns yellow during reproduction) with an incomplete black ring towards the end. Small brown shield, grey body with black head and neck. Lateral regions and white infra-feather feathers.

Remarks. We recorded three nests on 6 October 2018, 1 Feb. 2019, and 11 Mar. 2019. In the nests, we found four eggs (51.8 mm × 35.1 mm). The building material of the floating nests includes aquatic vegetation such as *Bidens laevis* (L.) Britton, Stern & Poggenb., 1888 (Larger Bur-Marigold), and *Schoenoplecptus californicus* (Mey.) Soják, 1972 (California Bulrush).

Distribution. North and Central America, Caribbean, and in northern South America.

Gallinula galeata Lichtenstein, 1818

Figure 8E–H

New records. Two individuals foraging in the aquatic vegetation, four months after the increase of the open water habitat in the wetlands of the ESNR on 17 June 2016. We recorded this species systematically in all samples since then.

Identification. Black chicks with frontal shield and light red beak, and light grey–brown young individuals in the ventral region with grey on the head and neck; body with a lateral white stripe; charcoal grey adults, with side stripe and white tail feathers, red forehead shield and red beak with yellow tip.

Remarks. We saw a nest hidden in the vegetations on 11 Mar. 2019. It had five eggs (44.5 mm × 31.7 mm). The building material of the floating nest includes *B. laevis* and *Ludwigia peploides* (Kunth) P. H. Raven, 1963 (Floating Primrose-Willow), and *Cenchrus clandestinus* (Hochst. ex Chiov.) Morrone.

Distribution. Eastern and southern Canada to northern Argentina.

Porphyriops melanops bogotensis (Vieillot, 1819)

Figure 9A–D

New records. Two individuals hiding in the aquatic vegetation of the wetland in ESNR on 07 December 2016. We recorded this species systematically in all samples since 14 December 2016.

Figure 8. Birds of Bogotá's Savannah. **A–D.** *Fulica americana*. **A.** Adult. **B.** Breeding evidence of eggs in ESNR. **C.** Chick. **D.** Immature. **E–H.** *Gallinula galeata*. **E.** Adult. **F.** Breeding evidence of eggs in ESNR. **G.** Chick. **H.** Immature.

Figure 9. Birds of Bogotá's Savannah. **A–D.** *Porphyriops melanops bogotensis*. **A.** Adult. **B.** Breeding evidence of eggs in ESNR. **C.** Chick. **D.** Immature. **E.** *Actitis macularius*. **F.** *Calidris melanotos*. **G.** *Phimosus infuscatus*. **H.** Breeding evidence of *P. infuscatus* eggs in ESNR.

Identification. Black chick with red beak; young brown body, darker towards the back, throat and chest. Adults with light green beak with blackish crown; head, back and supracaudal coverts of olive–brown colour; dark grey neck and chest; dark brown and white mottled flanks; abdomen and infracaudal coverts of white colour.

Remarks. During the study time we recorded 17 active nests with three to six eggs (40.8 mm × 28.8 mm). The nests were near to the water's edge, hidden in the vegetations or floating in the water. Nest building material includes aquatic vegetation such as *B. laevis*, *S. californicus*, and *Ciperus papirus* Linnaeus, 1753 (Papyrus Sedge). Several individuals have been seeing diving and swimming as an escape strategy. This species has been locally categorized as endangered danger (MADS 2017). In Bogotá and its surrounding, populations are threatened by urbanization and loss of habitat (Stiles et al. 2017). Conservation strategies for this species require alternatives such as those followed in the reserves under study, including the construction of artificial wetlands, where some populations appear to survive on the banks of the Bogotá River (Stiles et al. 2017).

Distribution. Center Colombia, northeastern and southwestern Brazil, southern Bolivia, northern Paraguay, eastern Argentina and Chile.

Actitis macularius Linnaeus, 1766

Figure 9E

New records. Individuals with breeding or reproductive plumage, as well as individuals with winter plumage, have been seen. We recorded this species systematically in all samples during most of the year from August to May.

Identification. It is the smallest species of sandpipers in the Bogotá Savannah. Dorsal region of brown colour, with the coverts barred. Eye list and chest sides are brown, whitish eyebrows. White ventral region (non-reproductive) and mottled (reproductive). Legs are yellow.

Remarks. We did not record any reproductive events. This species is a boreal migratory bird.

Distribution. From Canada to Chile and northern Argentina.

Calidris melanotos (Vieillot, 1819)

Figure 9F

New records. An individual foraging at the edge of the wetland in the ESNR on 10 Feb. 2019. It remained in the area for at least a week. We recorded this species systematically on 17 Feb. 2019.

Identification. Dark breast streaking which stops at a bold clean break on the breast, or pectoral area.

Remarks. We did not record any reproductive events. This species is a boreal migratory bird scarce in the Bogotá Savannah (ABO 2000).

Distribution. Alaska to southern South America.

***Phimosus infuscatus* Lichtenstein, 1823**
Figure 9G, H

New records. One individual flying over a patch of aquatic vegetation composed mainly of *T. latifolia* in the ESNR on 06 June 2018. In its beak the bird carried sticks as a possible nest building material. We recorded this species systematically on 17 Feb. 2018, 14 Aug. 2018, 15 January 2019, 15 Feb. 2019, 15 Mar. 2019 and 17 April 2019.

Identification. Red face with pink-coloured beak with bare facial skin, reddish legs and blackish greenish plumage.

Remarks. The species is abundant in other wetlands in the region, but in our study area only between one to three individuals were recorded.

Distribution. Northern Colombia east through the Venezuelan llanos, eastern Brazil west to Bolivia and south to central Argentina.

***Sicalis luteola bogotensis* Sparrman, 1789**
Figure 10A

New records. Several individuals foraging in the grasslands of the ESNR on 14 Feb. 2016. We recorded this species systematically in all samples since then.

Identification. Light olive dorsal region with striated brown; fluted brown crown; tailbone and sides of the head yellowish olive; wings and tail dark brown, lighter towards the edge; flanges and bright yellow eye area; female similar to the male but clearer.

Remarks. Between February and May, males are recorded flying energetically over the grasslands while vocalizing, a behavior associated with courtship.

Distribution. Southern Mexico to Argentina and Chile.

***Synallaxis subpudica* P.L. Sclater, 1874**
Figure 10B

New records. One individual hiding on the shrubby vegetation of the wetland in the ESNR on 15 December 2018. We recorded this species systematically on the same date and it is our unique record in the ESNR.

Identification. Adults with long spine; brown back; crown and part of the wings of rufous colour, greyish brown tail, belly and throat whitish brown; speckled throat with black, young ones are similar to adults, but without crown and wings with little ruff.

Remarks. This species is very common in the PJDNR. It is endemic from the eastern cordillera. We recorded a nest in PJDNR on April 27, 2019. It was built with prickly sticks shaped like a ball, inside a white egg.

Distribution. From the north area of Boyacá to Bogotá.

***Chrysomus icterocephalus bogotensis* Linnaeus, 1766**
Figure 10C, D

New records. Several individuals flying around the wetland vocalizing around the wetlands of the ESNR on 27 June 2016. Since then, we have recorded this species systematically in over 80% of the samples.

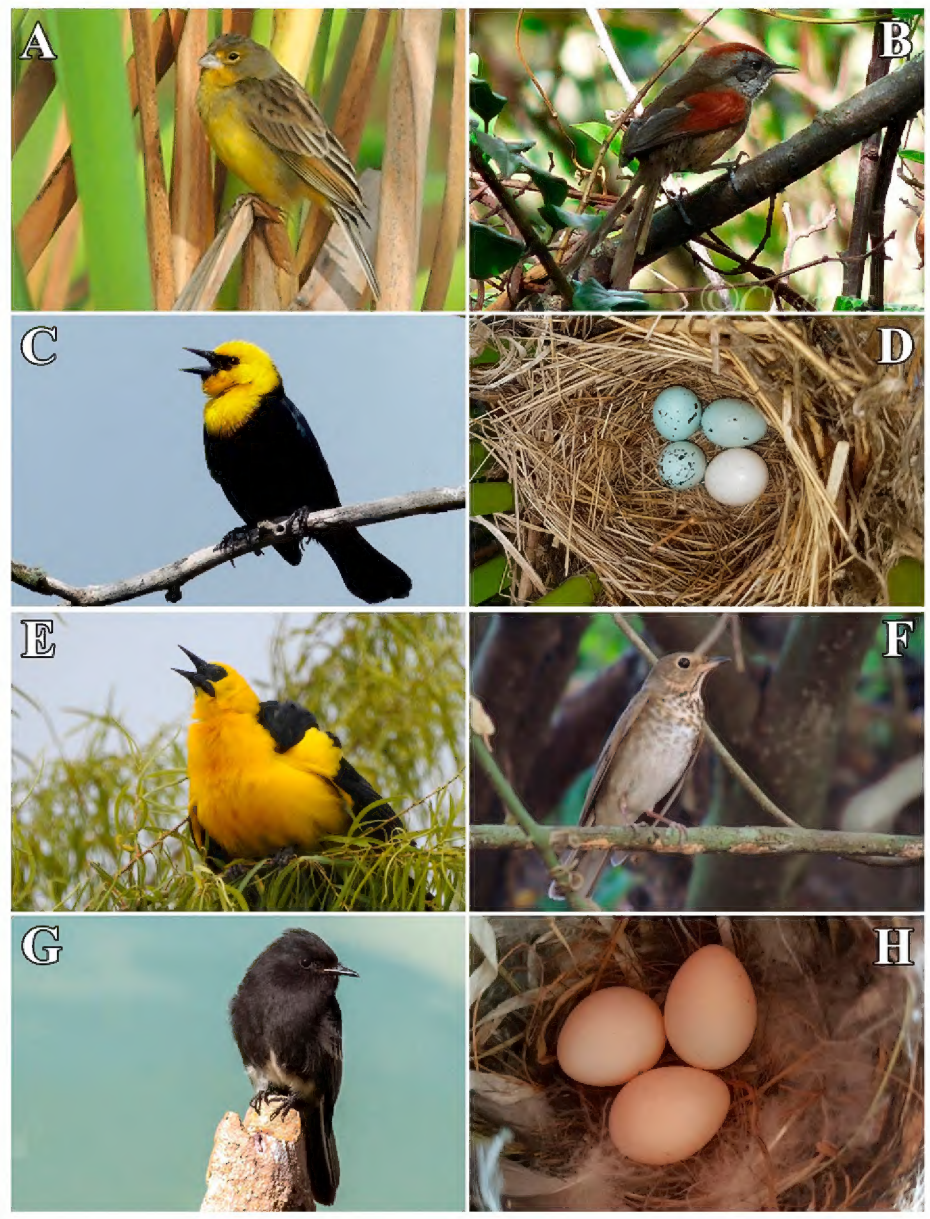

Figure 10. Birds of Bogotá's Savannah. **A.** *Sicalis luteola bogotensis* male. **B.** *Synallaxis subpudica*. **C.** *Chrysomus icterocephalus bogotensis* male. **D.** Breeding evidence of *C. icterocephalus bogotensis* parasitized by *Molothrus bonariensis* in ESNR. nest and eggs. **E.** *Gymnomystax mexicanus*. **F.** *Catharus ustulatus*. **G.** *Sayornis nigricans*. **H.** Breeding evidence of *S. nigricans* eggs in ESNR.

Identification. Adult males with black body and yellow hood with black flanges; conical peak; female with brown olive dorsal region with diffuse brown striatum; superciliary and yellow throat, with facial area and opaque yellow crown, rest of the olive yellow body; young ones similar to females but paler tending to whitish.

Remarks. On 16 June 2018, we observed a couple feeding a young individual of *Molothrus bonariensis* Gmelin, 1789. On 08 April 2019. we recorded two cup-shaped nests with light blue eggs (22.8 mm × 16.9 mm) with some dark spots in its widest part. The population has been increasing since 2017 after the restoration actions carried out in the wetlands.

Distribution. Colombia to northern Brazil and northeastern Peru.

***Gymnomystax mexicanus* Linnaeus, 1766**
Figure 10E

New records. An adult being attacked by individuals of *Chrysomus icterocephalus. bogotensis* during the latter's breeding season on 15 May 2018. The species was recorded systematically on 17 May 2018.

Identification. Adults with robust beaks; golden yellow body with back, wings, tail, black flanges and eye area; yellow triangular spot in the basal region of the wings.

Remarks. We did not record any reproductive events. This species is a visitor that came from warmer lowlands (Stiles et al. 2017).

Distribution. Colombia, Venezuela, northern French Guiana, Brazil and Peru.

***Catharus ustulatus* Nuttall, 1840**
Figure 10F

New records. One individual flying around the native plantations in the ESNR on 14 April 2018. Since then, it has been seen between October and May with greater abundance (up to 20 individuals) in mid-October. We recorded this species systematically on 17 October 2018. and 14 Feb. 2019.

Identification. Black-spotted chest with large eyes, long thin legs, olive brown back and mottled white chest with brown, light brown eye ring, brown head sides with lighter anterior area, black peak with pink basal region, pink legs; immatures similar to adults but with dark brown terminal spots.

Remarks. We did not record any reproductive events. This species is a boreal migratory bird.

Distribution. From Alaska and northern Canada to northern Argentina.

***Sayornis nigricans* Swainson, 1827**
Figure 10G, H

New record. One individual flying and foraging about the wetlands in the ESNR on 15 September 2016.

Identification. Body small with a large head and a medium-long squared tail, dark sooty gray overall with a white belly.

Remarks. On Aug. 30, 2019. We recorded a cup-shaped nest built with mud, feathers and hair under a concrete bridge. We found three eggs (20.20 mm × 15.41 mm). In ESNR the records of this species are unusual, while for PJDNR it is recorded constantly.

Distribution. Southwestern United States to Central and South America.

Discussion

We found out that our study reported species not recorded in other localities of the area, with 32% (41 spp.) not reported for Chingaza PNN, 72% (93 spp.) not reported for BOBPFR, 71% (92 spp.) not reported at the wetlands of Bogotá D.C., and 23% (30 spp.) not reported at any other localities in the area. At the same time, richness in the ESNR changed over the years: in 2016 we recorded 42 species; in 2017, 71 species; in 2018, 92 species, and in 2019, 86 species. The new records in the localities studied and the variation in richness in the ESNR can be related to the diversity of habitats in the reserve as a result of the restoration process. These habitats are the growing native forests, scrubs and wetlands, places where most of the bird species are found in the Bogotá region (Stiles et al. 2017). Other habitats in the study area where we reported several species are the eucalyptus patches and grasslands. All these mosaics of habitats found in the ESNR are located in strategic spots between the basin of the Bogotá river and the Tibito hill.

Another action of restoration was to reduce populations of the invasive macrophyte species (e.g., *Eichornia crassipes*) that had eutrophicated the two wetlands. Likewise, we reintroduced species of aquatic vegetation as *Juncus effusus* Linnaeus, 1753 (Lamp Rush), *Schoenoplecptus californicus*, *Persicaria punctata* (Elliott) Small, 1903 (Dotted Smartweed), and *Bidens laevis*, because these vegetations are crucial to the reproduction of some bird species. It is known that the extension of open water habitat and the enrichment of aquatic flora, benefit some species of water birds (Hinojosa-Huerta et al. 2008; Stiles et al. 2017).

For ESNR, threatened subspecies such as *Porphyriops melanops bogotensis* and *Oxyura jamaicensis andina* (Renjifo et al. 2016; MADS 2017) and other species, such as *Actitis macularius*, *Gallinula galeata*, *Fulica americana*, *Porzana carolina* (Linnaeus, 1758), *Spatula discors*, and *Tringa solitaria* Wilson, 1813 became more common. *Actitis macularius* and *T. solitaria* are associated with beaches and shallow waters with aquatic vegetation (ABO 2000). These requirements began to be fulfilled in 2016 due to the reduction of wetland slope, carried out in places where before there were no beaches.

Stiles et al. (2017) reported that the increase in shrubby vegetations around some wetlands in Bogotá has led to the increment in *S. subpudica* and *T. aedon* populations, however, these trends are not clear in the ESNR since *S. subpudica* has been reported just once and *T. aedon* had an occurrence frequency of 81% in 2016 which increased to 100% in the posterior years. *Synallaxis subpudica* inhabits dense shrubs like the ones found in the PJDNR; these shrubs are not totally established in the ESNR, but it can be expected that as restoration efforts progress, the occurrence of this species will increase.

Tyrannidae increased their richness from two spp. (2016) to nine or 10 spp. (2018–2019), with a historical richness of 14 species. The New World warblers (family Parulidae) raise the number of species from four spp. (2017) to eight spp. (2019), with a historical richness of 10 species. The increased richness of these families could be attributed to increases in the diversity of insects (e.g., dipterans and lepidopterans), recorded in this same period of time in ESNR (unpub. data). Individuals of Tyrannidae and Parulidae families have been widely recognized as predators of insects (Hilty and Brown 2001).

Distribution range of *S. sibilatrix* increased 170 km to the north of the country. It was recorded in Yopal (Casanare department). Meanwhile, other new records from species such as *B. longicauda*, *C. cheriway*, *C. vociferus*, *M. luteiventris*, *P. subis*, *P. tapera* and *S. cerulea* were expanded to the western of the country, because these species had been recorded in closer localities inside of the Bogotá Savannah. However, these records are

expected since our study area is in the route of migration of those species.

In the local context of our study, the Tocancipa and Sesquile development and management plan contemplates the execution of productive agricultural, livestock, mining, industrial and urbanization activities that eliminate and displace some native ecosystems, replacing others with *Pinus* sp. and *Eucalyptus* sp. plantations. Although the ordinance plan is emphatic in protecting priority locations in the provision of ecosystem services and scenic places, legally the only existing nature reserves in the municipality are the ESNR and PJDNR. The restoration process in these reserves began in 2016 and has included the plantation of at least 50,000 native plants to replace crops of *Solanum tuberosum* Linnaeus, 1753 (potato), *Zea mays* Linnaeus, 1753 (corn), *C. cladestinus*, and the raising of cattle. In addition, the restoration has allowed adapting artificial water bodies and restoring wetlands. The monitoring of this process has mainly focused on avifauna, which increased from 42 species in 2016 when the process began to the current record of 105 species, with 42 resident species.

Conclusion. The richness of bird species of our study area and the number of species not recorded in similar localities could be related to the diversity of habitats evaluated and the restoration actions implemented. Although the restoration objective of our project is to form a native forest, our actions are in the initial stages. Consequently, grasslands and forest in different successional status are common; these aspects could be reflected in the species we recorded. The monitoring of avifauna in changing ecosystems can increase the historical richness and is an elementary tool to know if the restoration actions have good impacts on the ecosystem.

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Authors' Contributions

FC-V, YC-M, DO collected data on the field and identified the specimens. FC-V, YC-M, FP-R contributed to the design of the study and critical revision, adding intellectual content.

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